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A GEOGRAPHIC INTERPRETATION OF NEW YORK CITY, PART II.*

BY

F. V. EMERSON.

THE LARGER HINTERLAND.—With the opening of the Erie Canal New York City entered upon its modern phase of development. An extensive and fertile hinterland had been made available which for thirty years was to be tributary to that city for its export trade. Under the influence of the canal northwestern New York rapidly became settled. The fertile soils were given to the production of wheat for which there was a rapidly enlarging market in the Eastern States. A foreign market was also opened by the repeal of restrictive English laws.† Where the Genesee River plunges into a post-glacial gorge, the milling city of Rochester grew up as a response to the wheat belt of the State and to the water power that was available for milling.‡

But the most important thing for New York City was the hinterland west of New York for which the canal was practically the only export route and New York the only port. The hinterland opened by the Erie canal extended from the Ontario plains to Wisconsin, but it was the country south of Lake Erie and Lake Michigan that was, in particular, tributary to New York during the years 1830-50, when the Erie Canal was the principal route to and from this region. It included most of Ohio, the northern halves of Indiana and Illinois, southern Michigan, and southeastern Wisconsin.

This is a region of moderate relief, a relief in part resulting from the glaciation of the region, which filled the pre-glacial valleys with drift scores and even hundreds of feet deep. The drift, in contrast with that of New England, is not notably stony. It is largely derived from shales and limestones, and is, in consequence, largely of fine material suitable for conversion into fertile soil.

The surface, although not level, is smooth in contrast to the Allegheny Plateau to the east. A study of the recorded elevations in Ohio shows that over seventy per cent. of them lie between altitudes of 600 and 1,000 feet; in Indiana about fifty per cent. lie between the same altitudes; in Illinois, nearly ninety per cent. of these altitudes lie between 400 and 700 feet.* These elevations, however, are largely from readings taken in valleys. The general altitude, as shown by the large scale topographic maps, is from 500 to 1,000 feet.

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* Part I printed in BULLETIN for October.

† W. P. Sterns' "Foreign Commerce of the United States." *Journal Political Economy*, 8: 490.

‡ From 1829 to December, 1831, Rochester exported 529,725 barrels of flour. Niles' Register, 39: 334.

The drainage of this hinterland is for the most part established on the recent Wisconsin and Illinoian drift and is in the youthful stage of erosion. The divides are broad and comparatively level, the valleys generally narrow, and swamps are not infrequent.

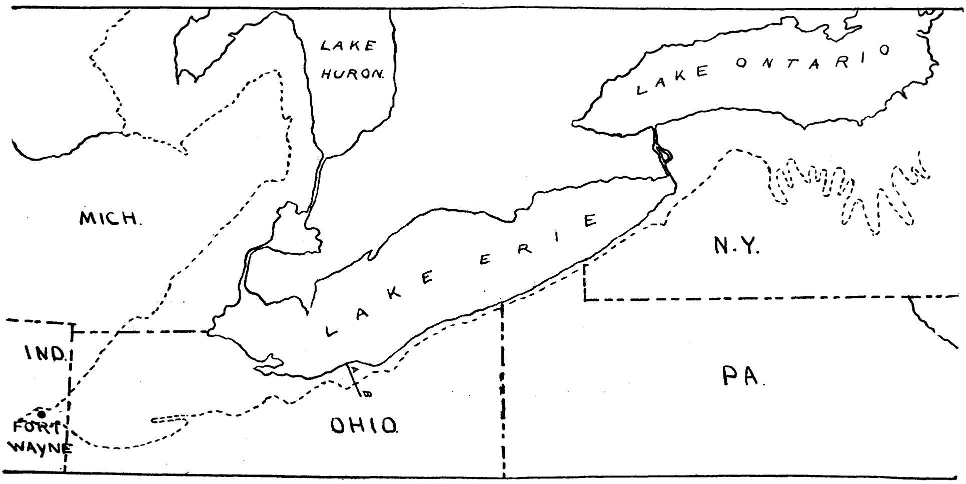

FIG. 18.—Map showing the maximum extension of the glacial lakes in the Indiana-Ohio New York region. The line *A B* in Ohio shows the location of the section in Fig. 19.—Leverett and Taylor, Monograph 41, U. S. Geol. Survey, plate 26.

The Wisconsin ice in its retreat from the Ohio-St. Lawrence divide, ponded the waters flowing north from that divide. The result was a series of marginal lakes, a late member of which was Lake Warren, which has been mentioned before. The maximum extension of some of these lakes is shown in Figure 18. The principal results of geographic interest of these lakes are: their abandoned outlets, their beaches, and the fertile lacustrine silts and clays that accumulated on their bottoms.

The soils of the region are fertile, and their fertility results from several causes. The soils are mostly of glacial origin and largely derived from local shale and limestone which are easily comminuted and furnish available plant food. The cool climate, the low slopes and the poorly organized drainage make for the accumulation of humus, and this, together with the fine material of glacial origin, produces the rich, black prairie soils. Within the limits of the marginal glacial lakes are found the very fertile soils composed in part of lake silts.*

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* The data for the computation are taken from "A Dictionary of Altitudes," Henry Gannett, U. S. Geological Survey. 1899.

The lake beaches and their accompanying deltas and bars were available for easy settlement, and the beaches and bars offered good roads.† The use of these beaches for roads and railroads is well shown in the topographic maps of the Cleveland region. The immediate offshore deposits, often mingled with clay silts, give a fertile, warm loam‡ (Fig. 19). Farther west in Indiana, Illinois, Iowa, Nebraska and Missouri, the loess soil is more abundant. It gives rise to an exceedingly fertile soil.§

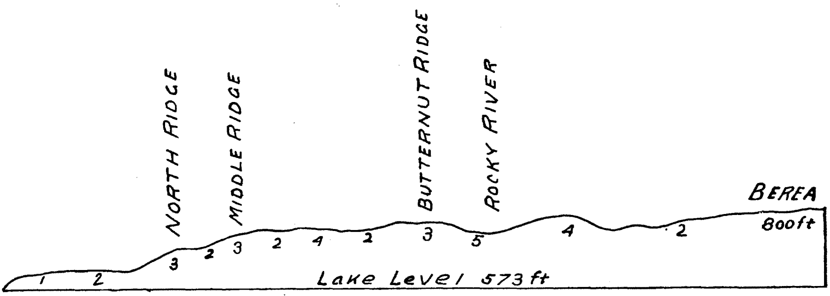

FIG. 19.—Diagram to show the relations between shore lines and soils. Profile from Lake Erie near North Dover, Ohio, southeast to Berea, Ohio. There are three well-marked beaches: North Ridge, Middle Ridge, and Butternut Ridge. Soil types: (1) DeKalb clay, formed largely by wave action on shale cliffs. (2) Miami clay loam, consisting largely of drift mingled with weathered fragments derived from the underlying shale. (3) Dunkirk gravelly loam, a soil characteristic of the ridges that were beaches of former glacial lakes. (4) A clay soil, consisting largely of offshore deposits. (5) Wabash loam, alluvial soil deposited on a flood plain. From the U. S. Soil Survey Report of the Cleveland, Ohio, Area, 1905.

The climate of the Upper Mississippi Basin is continental. The hot summers and cold winters give the large temperature range characteristic of the continental climate. The rainfall is ample and fairly evenly distributed through the year. It is a climate well adapted to cereal crops and dairy farming.

The Responses to the Larger Hinterland.

POPULATION AND PRODUCTS.—The responses to the level, fertile lands with their easy access by canal and lake were rapid. In 1820 the settlements in this region were grouped along the Ohio River (see Fig. 11), but by 1830 northern Ohio and Indiana had filled up so that they possessed a density of six to forty-five inhabitants per square mile. As early as 1823 the number of passengers and immigrants landing at New York exceeded not only that of any other port, but was more than the combined numbers entering Boston, Philadelphia, and Baltimore (Fig. 20). Until 1855 there was no division of the passengers so as to show the number of immigrants. Of the immigrants, a large number passed through the Erie Canal to its tributary territory. In 1855 it was estimated that thirty per cent. of the immigrants landing at New York passed through the Erie Canal into Ohio, Michigan, Illinois, Indiana, Iowa, Wisconsin, and Minnesota.* Prior to that time the percentage must have been greater, since there were not lines of easy communication from New York westward other than the Erie Canal until 1835. According to Andrews, the principal work of the boats in Lake Erie at that time was the transportation of immigrants and their effects westward from Buffalo.†

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* For example, see the following soil reports: Miami Black Clay Loam, Toledo, O. Area, 1902; Dunkirk Clay, Ashtabula, O. Area, 1903; Clyde Series, Saginaw, Mich. Area, 1904.

† Geological Survey of Ohio, 1870, p. 322.

‡ For example, the Miami soil series; Toledo Area, 1902; also, the Dunkirk series, Ashtabula Area, 1903.

§ Soil Survey of Winnebago Co., Ill., 1903.

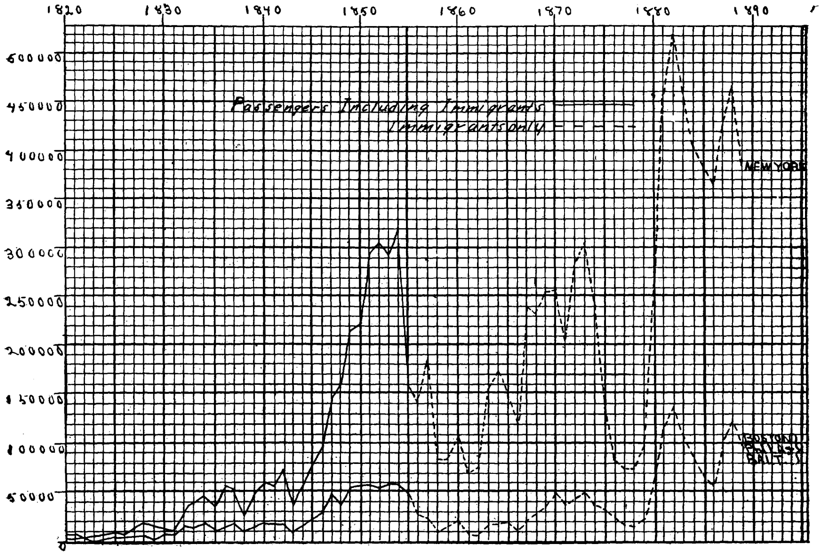

FIG. 20.—Total number of passengers arriving each year, 1820 to 1855, and total number of immigrants arriving 1856 to 1889.
From "Tables of Alien Passengers and Immigrants from 1820 to 1888. Treasury Dep't, Bureau of Statistics, 1889."

The prairie plains of northern Ohio, Indiana, and Illinois were easily brought under cultivation and produced bountiful crops, but the lack of an accessible market made the surplus crop almost superfluous, for the bulky crop would have its value consumed in transportation to market. Andrews, writing in 1854, estimated that, according to the current prices, wheat would have its value consumed by the cost of wagon transportation in a journey of 330 miles, and corn in a journey of 170 miles.* Before the end of the decade 1820-30 it is estimated that the Erie Canal had reduced freights to the East 66 per cent.† The great wheat-producing region was transferred from western New York to Ohio and later to the westward. In 1830 Rochester imported 200,000 bushels of wheat from Ohio and her wholesale trade reached to Detroit.‡

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* E. J. Benton. *The Wabash Trade Route in the Development of the Old North West.* Johns Hopkins University Studies, 21: 1, p. 97.

† Israel D. Andrews. *Trade and Commerce of the British North American Colonies and the Trade of the Great Lakes and Rivers.* Thirty-second Congress, First Session; Executive Document, No. 112. 1853 p. 55.

In 1834 Chicago felt the quickening influence of the canal, and in two years had multiplied her commerce many fold.§ The spread of population in Michigan was somewhat slower, but in 1840 immigration into that State had become very active, especially in the southern part.||

THE OHIO CANALS.—The success of the Erie Canal was a stimulus to which the physiographic conditions of the region north of the Ohio allowed a ready response. The north-south direction of the river valleys of Ohio and Indiana suggested available canal routes up to the Ohio-Lake Erie divide, which is of moderate elevation and has been but little dissected. Moreover, the northern and central portions of those States are deeply covered with drift which was easily excavated. Five routes were considered, all of which included the partial canalizing of some of the north-south rivers (Fig. 21). They were: The Mahoning-Grand River route; the Cuyahoga-Muskingum route; the Black-Muskingum route; the Scioto-Sandusky route; and the Maumee-Great Miami route.¶ Of these, two compromise routes were authorized in 1825. The Ohio and Erie Canal was to pass from Cleveland up the Cuyahoga Valley over the divide and down the Scioto Valley to Portsmouth. It was completed in 1832.** The Miami Canal was to pass from Cincinnati northward along the Great Miami Valley, with the promise of its extension to Toledo in the near future, which promise was fulfilled in 1835. The population

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* Andrews, *ibid.*, p. 381.

† Sterns, *ibid.*, p. 448.

‡ Niles' Register, 39: 139. Quoted from the *Rochester Daily Advertiser*.

§ Niles' Register, 47; 55.

|| Hannah E. Keeth, "An Historical Sketch of Internal Improvements in Michigan, 1836-46." Publications of the Mich. Pol. Sci. Ass'n., Vol IV, No. 1, July, 1900, pp. 9, 12.

¶ "History of Ohio Canals," C. P. McClelland and C. C. Huntington. Published by the Ohio State Archæological and Historical Society. Columbus, O., 1905. Most of the facts relating to the Ohio Canals are taken from this book.

** Andrews, *ibid.*, p. 355.

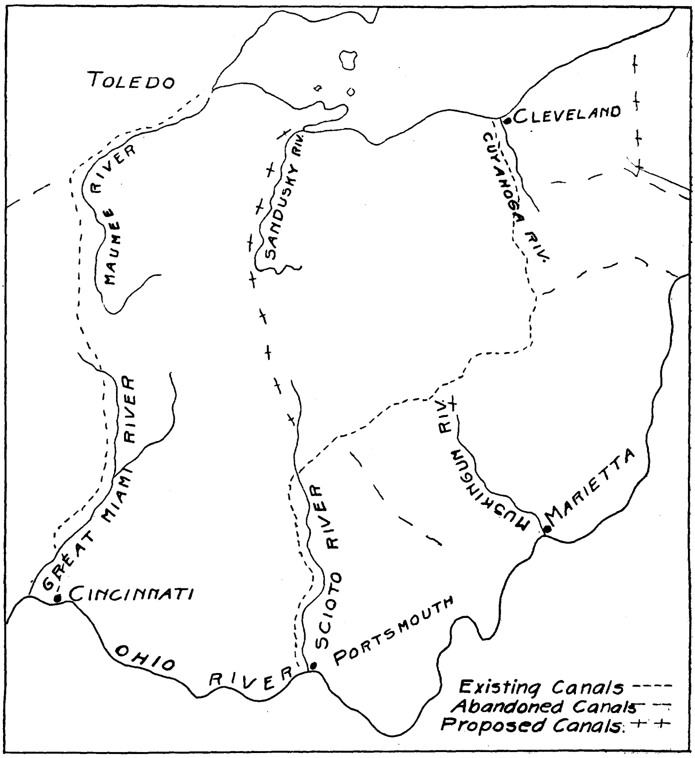

FIG. 21.

of Ohio was densest in the northeast, south, and southwest parts of the State, and this population was first served in canal construction. The favourable conditions of canal construction are reflected in the low average cost of construction per mile. According to De Bow, the cost and mileage of the Ohio canals were as follows:*

	LENGTH.	COST.	AVERAGE COST PER MILE.
Ohio Canal	334 mi.	$4,695,203.69	$14,055
Miami Canal	85 mi.	1,237,552.16	14,441
Miami Canal (extension)	139 mi.	2,856,635.66	20,551

The average cost per mile was lower than that of the Erie Canal and much lower than that of the Chesapeake and Ohio Canal. One feature due to the moderately high and comparatively level watershed in Ohio was more expensive and troublesome than that of the Erie or Chesapeake and Ohio canals. Large storage reservoirs covering 32,903 acres and costing $1,430,222.07 were necessary to provide water to carry the canals over the divide.

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* De Bow's Review, 3: 133.

The system of canals gave the surplus crops of much of Ohio an available market.[*] New York was a much better market than the fluctuating and distant market at New Orleans. Before the completion of the Ohio canals, flour sold at Cincinnati for $3.50 per barrel and at New York for $8.00 per barrel.[†]

THE ILLINOIS AND INDIANA CANALS.—As western Ohio and eastern Indiana filled up with settlers, the demand for a southwesterly connection between Lake Erie and the Ohio grew stronger. Here, as in the case of the Erie Canal, the physiographic conditions extended an invitation for such a canal. Some of the early marginal glacial lakes had an outlet past Fort Wayne, Ind., southwest to the Wabash (see Fig. 18). The physiographic conditions were even more favourable for this canal than they were for the Erie Canal, but the population was too sparse and the State too poor, promptly to carry the project through. The canal was building from 1832 to 1851, when the Wabash was connected with Lake Erie at Toledo. The average cost was $16,425 per mile.[‡]

Most of the flour and wheat of Ohio went to the East by the Lakes and Erie Canal, while the corn and pork went south by the Ohio River. The movements of flour by the canals at Cleveland and Toledo are shown in Figures 22 and 23. The maximum movement is seen to be in the decade 1850-60. The maximum revenue earned by the canals was reached somewhat earlier (Fig. 24). Considerable water power existed near the summit level, and this was available for manufacture along the canal zone.[§] Akron, Massillon, and other manufacturing towns grew up in response to this water power.[||]

Prices were equalized, the exports bringing a price determined by

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[*] The width of the zone on each side of the canal through which the canal influence extended has been estimated at one hundred miles. "History of Ohio Canals," p. 128.

[†] Niles' Register, April 26, 1817, gives figures illustrating the difference in prices at ports on the lakes and at interior points.

Price of flour and corn per barrel at:

	SANDUSKY.	COLUMBUS.	CIRCLEVILLE.	CHILLICOTHE.
Flour..........	$15.00	$6.00	$6.50	....
Corn..........	1.50	.50	.37	$0.40

Niles' Register, 12: 144.

[‡] Tenth Census, Vol. IV, Canals, p. 32.

[§] In 1839 there was leased from the Ohio canals water to operate 207 pairs of four and a half feet mill stones. "History of Ohio Canals," p. 133.

[||] Semple, American History and Its Geographic Conditions, p. 271.

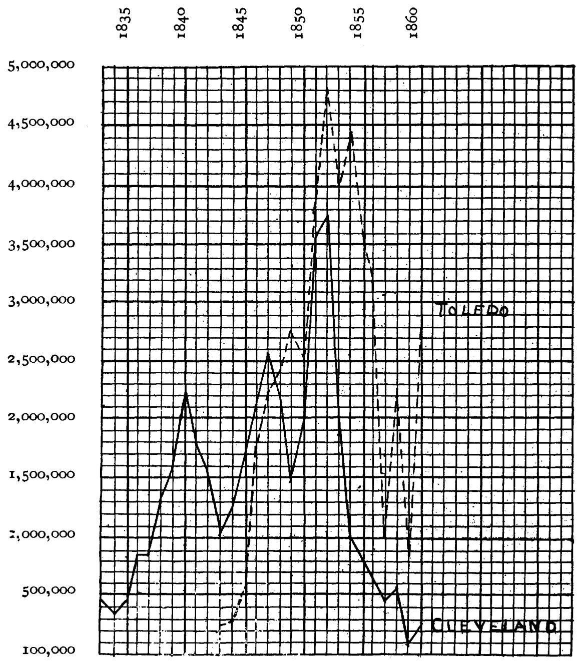

FIG. 22.—Graphs showing the number of bushels of wheat and corn arriving at Cleveland, 1833-60, and Toledo, 1843-60. For each port the graph represents the total number of bushels of wheat and corn added together.
From tables in the "History of Ohio Canals."

the foreign rather than the local demand, and the imports bringing lower prices in consequence of reduced cost of transportation.* In 1851, 90 per cent. of the flour and 50 per cent. of the wheat from this region was sent to New York.† Philadelphia and Baltimore lost the export trade of the region‡ and a zone of country ninety to one hundred and sixty miles wide was established tributary to the Erie Canal.§

The last important canal to open up the hinterland of New York was the Illinois and Michigan Canal, which was opened along the outlet channel of the glacial Lake Chicago in 1842. It was built too late to be successful in the developing competition of the railroads, and, of itself, added but little to the tonnage of the Erie Canal.||

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* For instance, wheat at Delphi, Ind., before the opening of the canal brought forty-five cents per bushel (1840), but two years later it brought one dollar per bushel. Before the opening of the canal in 1840, salt at the same place cost nine dollars per barrel, but in 1842 it cost only four dollars. Benton, *ibid.*, p. 109.

† *Ibid.*, p. 104. ‡ *Ibid.*, p. 105. § *Ibid.*, p. 97. || Poor's Manual, 1881, p. xxiv.

INFLUENCE OF THE LARGER HINTERLAND UPON NEW YORK. — With the effective opening of this territory in the Upper Mississippi Valley, the commercial supremacy of New York was for the time assured. The Erie Canal offered the only practicable outlet to the sea, and New York was the only point of transfer from the Hudson to the Atlantic. In spite of decreasing tolls (Fig. 25), the revenue of the Erie Canal rapidly increased, and by 1845 the canal indebtedness was paid, the managers buying in the bonds at 20 per cent. premium.* In 1852 the canal was enlarged from a width of forty feet to seventy feet, and from a depth of four feet to seven feet. In 1882 the tolls were abolished. Up to this time, the total cost of construction had been $49,591,853, and the expense of maintenance $29,270,301, while the revenues were $121,461,871, thus leaving a surplus of $42,599,718.†

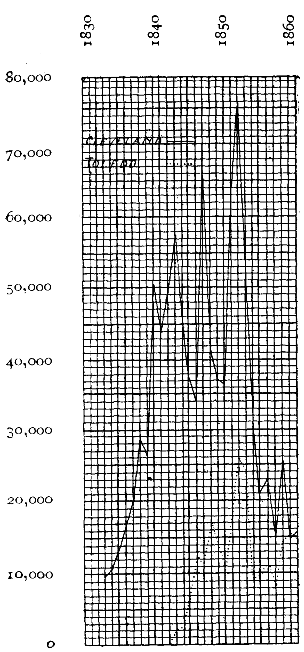

FIG. 23.—Graphs showing the number of barrels of flour arriving via the Ohio Canals at Cleveland, 1833–60, and Toledo, 1842–60. From tables in the "History of Ohio Canals."

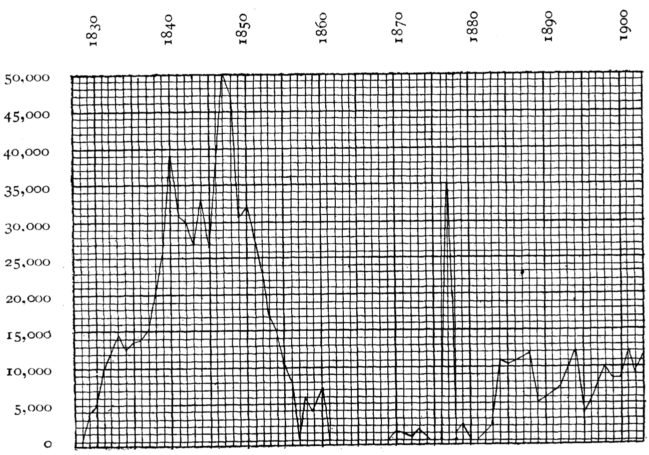

FIG. 24.—Receipts of the Ohio Canals, 1827–1903. From "History of Ohio Canals," page 170.

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* *American Railroad Transportation*, E. R. Johnson, 1904, p. 30.

† Report on New York Canals, p. 151.

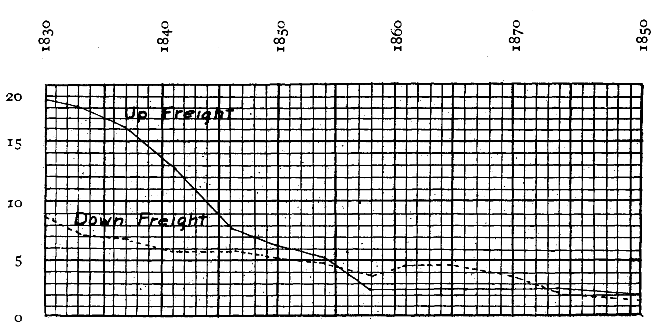

FIG. 25.—Average freight rates per ton on the Erie Canal, 1830–1881. From New York Report on Canals, page 192.

The through movement of wheat through the Erie Canal exceeded the local movement about 1839 (Fig. 26), while the through movement of all goods became predominant about seven years later (Fig. 27). The graphs tell the story of the rapidly developing hinterland of New York. If data were at hand and plotted, the imports at New York that were received for this hinterland would doubtless show a like increase. The nearly contemporaneous increase of immigrants and passengers entering New York (see Fig. 20) must be closely related to the development of New York's hinterland.

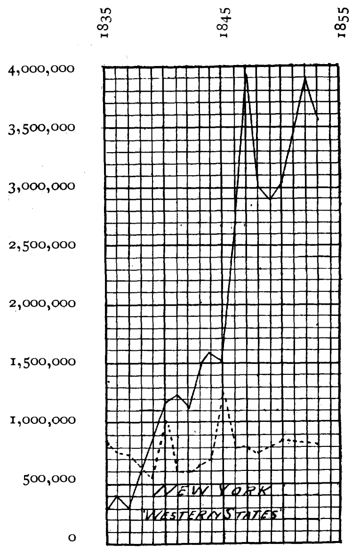

FIG. 26.—Movement of flour on the Erie Canal from "Western States" and from New York State from 1835 to 1853. One barrel of flour is assumed to be equivalent to five bushels of wheat. It is assumed that all wheat from "Western States" reached tidewater. The table, therefore, is of value chiefly as a comparison of the movement of wheat and wheat products during the time indicated. Solid line—flour from "Western States"; broken line—flour from New York State.

Report of Auditor of Canals of New York, 1854, page 11.

The tonnage cleared at the port of New York shows a somewhat lagging response to the increasing through canal traffic from 1840 to 1848.* But during that time the tonnage cleared at New York nearly quadrupled.

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* Tonnage cleared at New York:

1826......	227,857	1840......	408,768	1855......	1,445,754
1830......	243,155	1845......	483,525	1857......	1,756,441
1835......	366,389	1850......	982,478	1858......	1,460,998

Report of the New York Chamber of Commerce, 1858, p. 150.

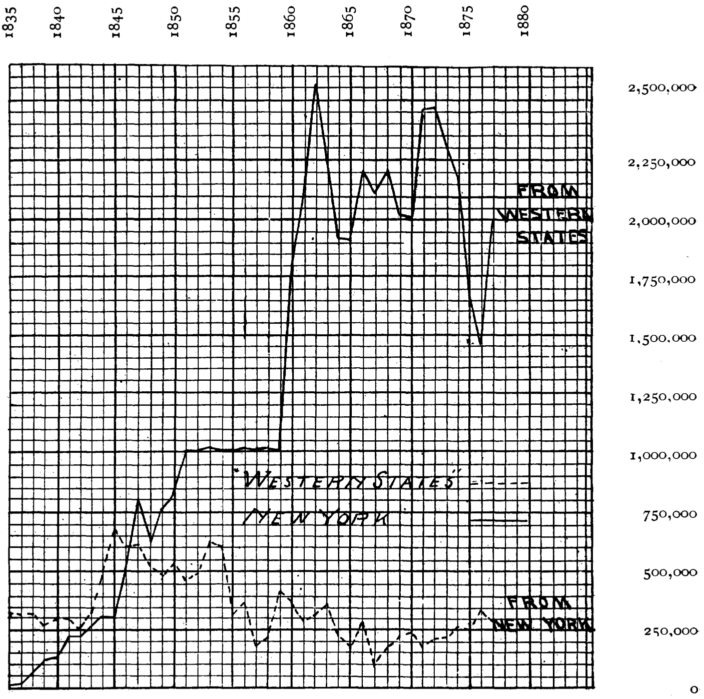

FIG. 27.—Tons arriving at tidewater via Erie Canal from Western States and from New York State. From Report on New York Canals, pp. 169–170.

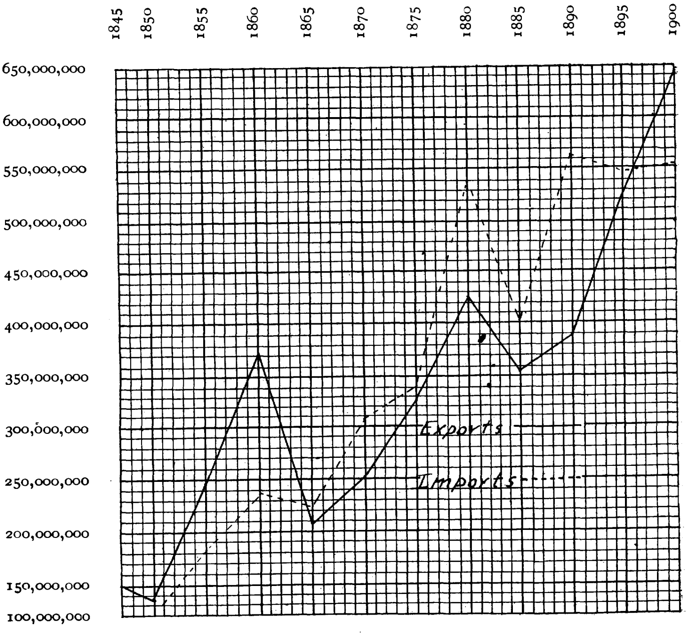

FIG. 28.—Value of exports and imports of New York, 1847–1900. From reports of the New York Chamber of Commerce.

In the decade 1850-60 the value of the exports from New York increased rapidly and reached a point that was not exceeded until nearly twenty years later (Fig. 28). But during that decade the city had at least three lines of railroad connecting it with its western hinterland. From 1820 the population curve for the cities around New York harbour begins to rise faster (Fig. 29), and since that time New York has led all other ports of entry for passengers and immigrants (see Fig. 20).

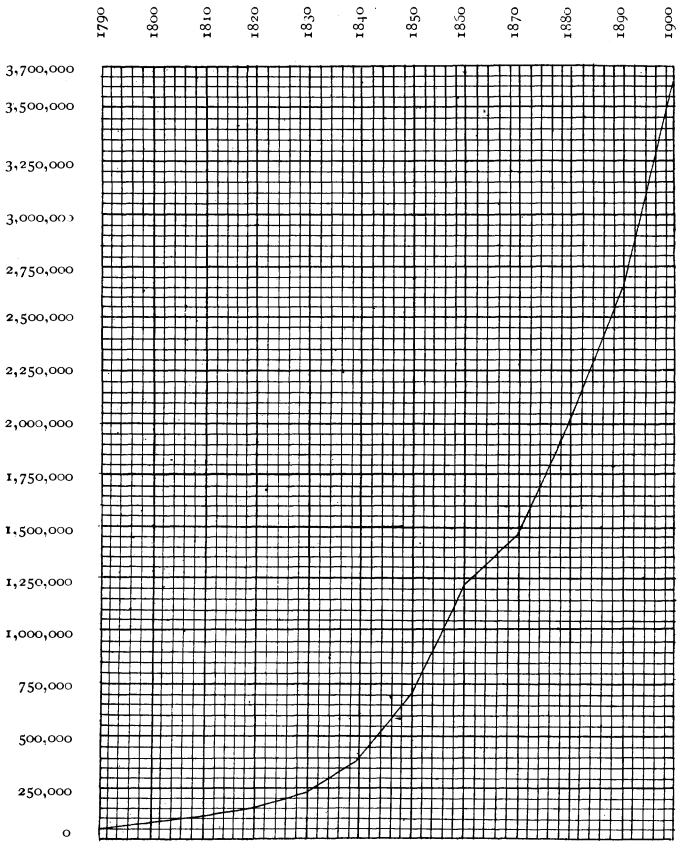

FIG. 29.—Population of New York and vicinity, including Brooklyn and Jersey City, 1790–1900. The figures for New York and vicinity, including Brooklyn, are estimates given in the 12th Census, Vol. I, part I, p. LXXX. The population of Jersey City is included from 1840 to 1900.

The close of the period of predominant canal influence in the United States, say, about 1855, found New York with a monopoly of the trade of the Upper Mississippi Basin, which had become populous and wealthy. (Figs. 30 and 31.) It was estimated that in 1850, 5,403,595 persons, occupying 26,199,050 acres of improved land, were dependent on that port for much of their export and import trade.* The City of New York at that time had a population of 515,547; Philadelphia of 340,045; Boston of 136,811, and Baltimore of 169,054.

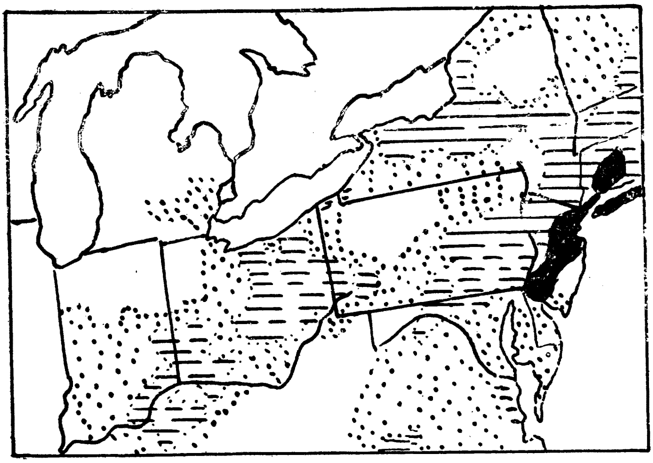

FIG. 30.—Population map in 1840. The dotted areas indicate a population of 18 to 45 per square mile, the lined areas a population of 45 to 90, and the dark areas a population of over 90.
From the Statistical Atlas, 12th Census.

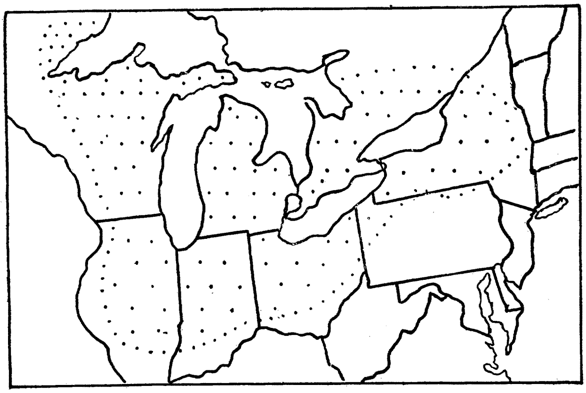

FIG. 31.—Map showing the territory estimated to be tributary to the Erie Canal in 1854 (the dotted area). From the Annual Report of the State Engineer of the Canals of New York, 1854.

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* Report of the New York Chamber of Commerce, 1862, p. 207.

(*To be continued.*)